Portable ultrasonic flow measurement of gas in hazardous areas

Portable instrument for non-invasive, quick ultrasonic flow measurement with clamp-on technology for all types of piping

Features

- Precise bi-directional and highly dynamic flow measurement with the non-invasive clamp-on technology
- High precision at fast and slow flow rates, high temperature and zero point stability
- Portable, easy-to-use flow transmitter with 2 flow channels, multiple inputs/outputs, an integrated data logger with a serial interface
- Extremely resistant carbon fiber housing
- Covered by ATEX/IECEx zone 2 certification
- Compact and very lightweight, allowing the measuring system to be easily carried as personal luggage, e.g. for offshore visits
- Water tight; resistant against oil, many liquids and dirt
- Li-Ion battery provides up to 14 hours of measurement operation
- Automatic loading of calibration data and transducer detection for a fast and easy set-up (less than 5 min), providing precise and long-term stable results
- User-friendly design
- Transducers available for a wide range of inner pipe diameters and fluid temperatures
- Rugged transducers (ATEX/IECEx zone 1 and 2, resistant to rough environments, dust and humidity)
- Robust, water-tight (IP67) transport case with comprehensive accessories
- QuickFix for fast mounting of the flow transmitter in difficult conditions
- Including measurement of liquids

FLUXUS G608 supported by handle


Measurement with transducers mounted with the portable Variofix VP

Applications

Designed for the following industries:

- Upstream (on- and offshore)
- Midstream and downstream (pipelines and refineries)
- Chemical industry
- Energy sector (e.g. HVAC, geothermal, power plants)


Measurement with the flow transmitter fixed to the pipe with the QuickFix pipe mounting fixture

Table of contents

Function

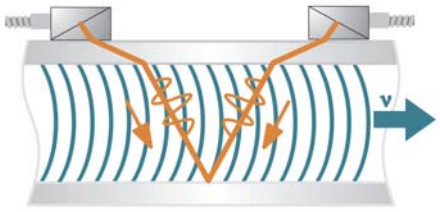
Measurement principle

In order to measure the flow of a fluid in a pipe, ultrasonic signals are used, employing the transit time difference principle. Ultrasonic signals are emitted by a transducer installed on the pipe and received by a second transducer. These signals are emitted alternately in the flow direction and against it.

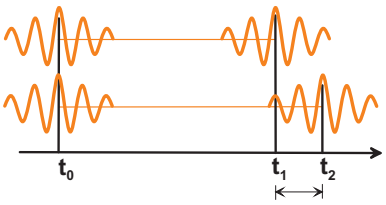
As the fluid in which the signals propagate is flowing, the transit time of the ultrasonic signals in the flow direction is shorter than against the flow direction.

The transit time difference, Δt, is measured and allows the flowmeter to determine the average flow velocity along the propagation path of the ultrasonic signals. A flow profile correction is then performed in order to obtain the area averaged flow velocity, which is proportional to the volumetric flow rate.

Two integrated microprocessors control the entire measuring process. This allows the flowmeter to remove disturbance signals, and to check each received ultrasonic wave for its validity which reduces noise.



Path of the ultrasonic signal



Transit time difference Δt

Calculation of volumetric flow rate

$\dot{V} = k_{Re} \cdot A \cdot k_a \cdot \Delta t/(2 \cdot t_{fl})$

where

$\dot{V}$	-	volumetric flow rate
k_{Re}	-	fluid mechanics calibration factor
A	-	cross-sectional pipe area
k_a	-	acoustical calibration factor
Δt	-	transit time difference
t_{fl}	-	transit time in the fluid

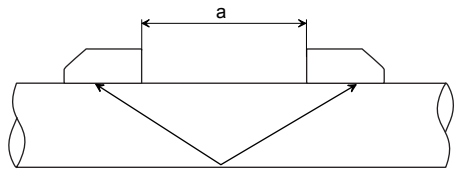
Number of sound paths

The number of sound paths is the number of transits of the ultrasonic signal through the fluid in the pipe. Depending on the number of sound paths, the following methods of installation exist:

- **reflection arrangement**
  The number of sound paths is even. Both of the transducers are mounted on the same side of the pipe. Correct positioning of the transducers is easier.
- **diagonal arrangement**
  The number of sound paths is odd. Both of the transducers are mounted on opposite sides of the pipe. In the case of a high signal attenuation by the fluid, pipe and coatings, diagonal arrangement with 1 sound path will be used.

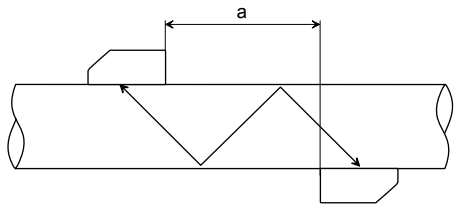
The preferred method of installation depends on the application. While increasing the number of sound paths increases the accuracy of the measurement, signal attenuation increases as well. The optimum number of sound paths for the parameters of the application will be determined automatically by the transmitter.

As the transducers can be mounted with the transducer mounting fixture in reflection arrangement or diagonal arrangement, the number of sound paths can be adjusted optimally for the application.

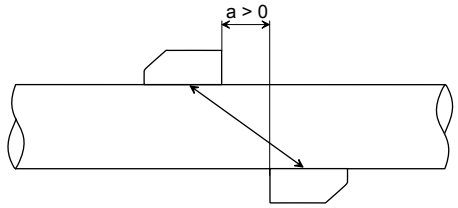


Reflection arrangement, number of sound paths: 2

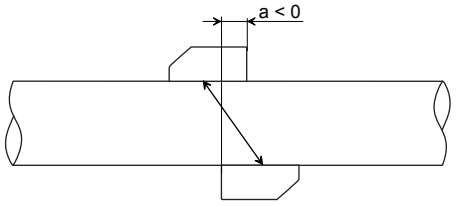
a - transducer distance



Diagonal arrangement, number of sound paths: 3



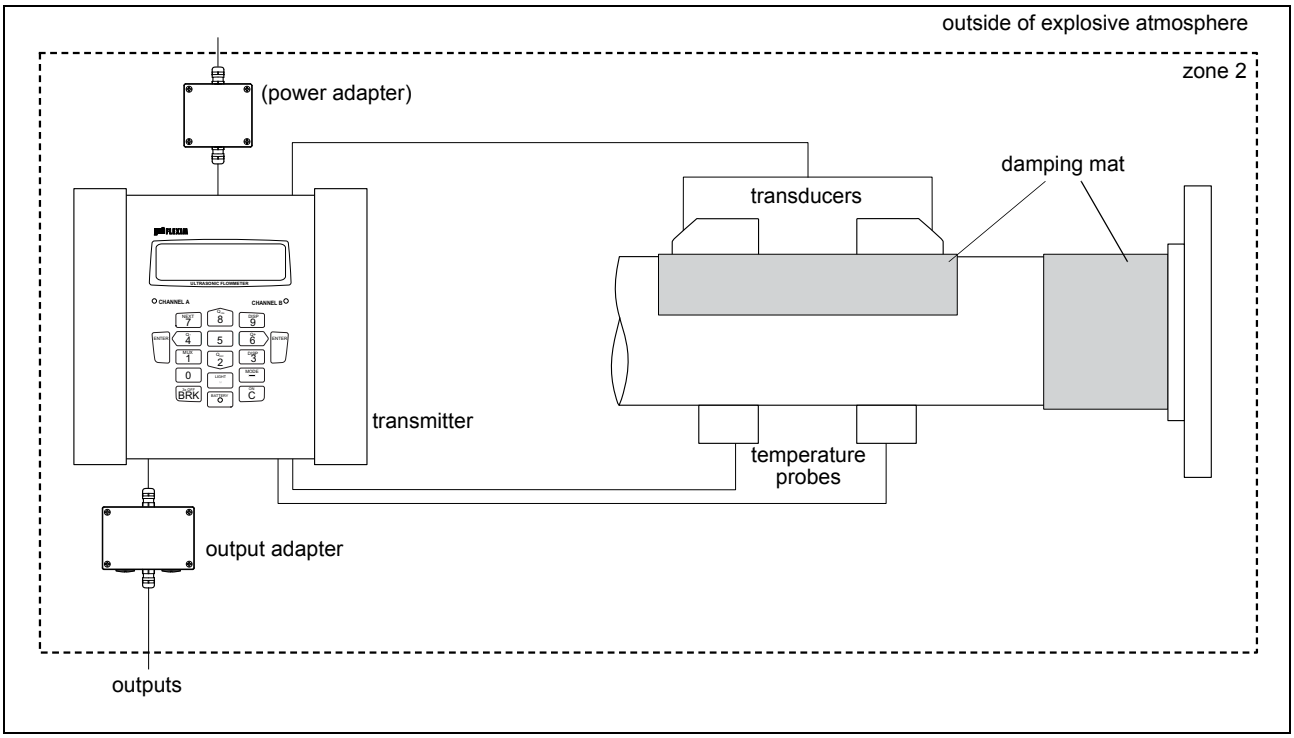
Diagonal arrangement, number of sound paths: 1



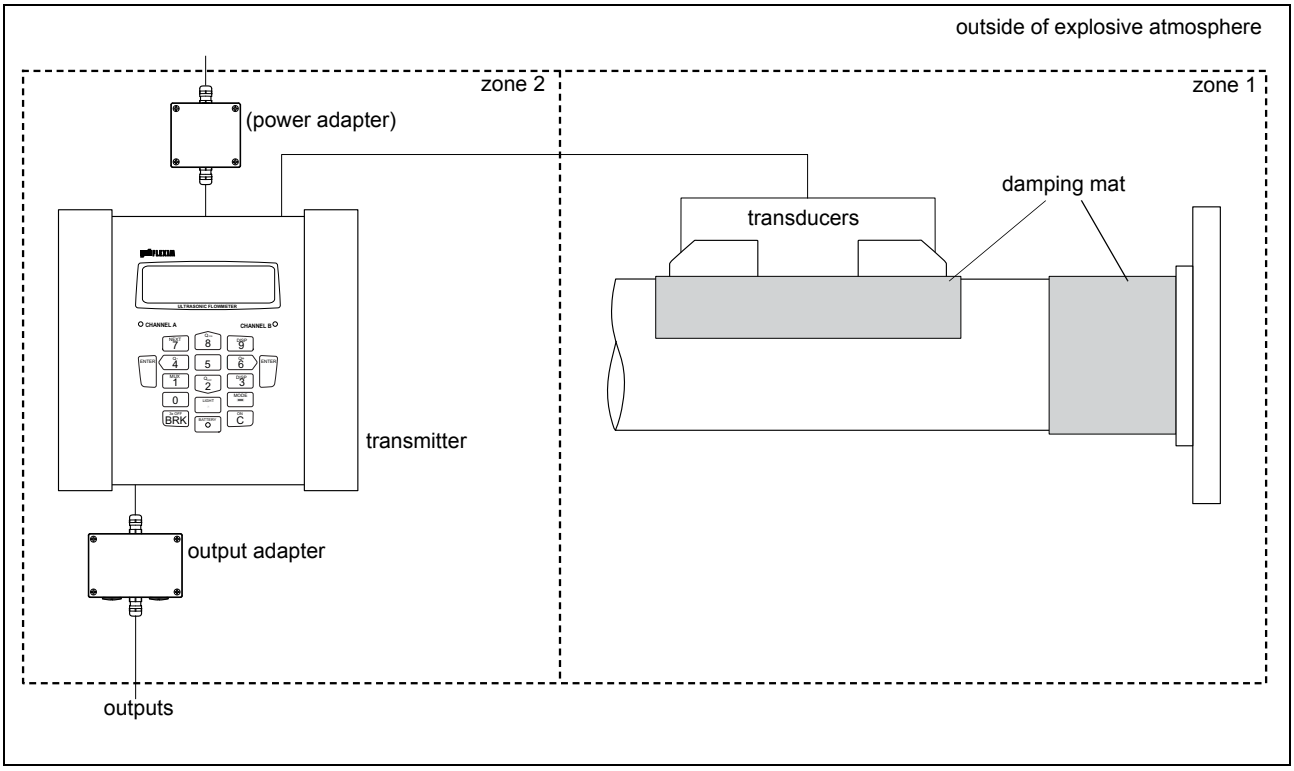
Diagonal arrangement, number of sound paths: 1, negative transducer distance

Typical measurement setup

zone 2



zone 2/1



Standard volumetric flow rate

The standard volumetric flow rate can be selected as physical quantity to be measured. It will be calculated internally by:

$\dot{V}_N = \dot{V} \cdot p/p_N \cdot T_N/T \cdot 1/K$

where

$\dot{V}_N$	-	standard volumetric flow rate
$\dot{V}$	-	operating volumetric flow rate
p_N	-	standard pressure (absolute value)
p	-	operating pressure (absolute value)
T_N	-	standard temperature in K
T	-	operating temperature in K
K	-	compressibility coefficient of the gas: ratio of the compressibility factors of the gas at operating conditions and at standard conditions Z/Z_N

The operational pressure p and the operational temperature T of the fluid will be entered directly as fixed values into the transmitter.

or:

If inputs are installed (optional), pressure and temperature can be measured by the customer and fed in the transmitter.

The gas compressibility coefficient K of the gas is entered in the transmitter:

- as fixed value or
- as approximation according to e.g. AGA8 or GERG

Flow transmitter

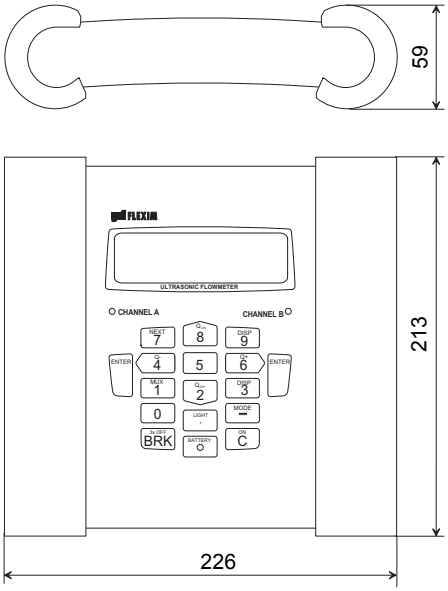
Technical data

FLUXUS		**G608**-A2**
design		portable, zone 2
		
measurement		
measurement principle		transit time difference correlation principle
flow velocity		0.01...35 m/s, depending on pipe diameter
repeatability		0.15 % of reading ±0.01 m/s
fluid		all acoustically conductive gases, e.g. nitrogen, air, oxygen, hydrogen, argon, helium, ethylene, propane
temperature compensation		corresponding to the recommendations in ANSI/ASME MFC-5.1-2011
accuracy		
volumetric flow rate		± 1...3 % of reading ±0.01 m/s depending on application ± 0.5 % of reading ±0.01 m/s with field calibration
flow transmitter		
power supply		100...230 V/50...60 Hz (power supply unit, outside of explosive atmosphere) 10.5...15 V DC (socket at transmitter, with power adapter (optional)) integrated battery
integrated battery		Li-Ion, 7.2 V/4.5 Ah operating time (without outputs, inputs and backlight): > 14 h
power consumption		< 6 W
number of flow measuring channels		2
damping		0...100 s, adjustable
measuring cycle (1 channel)		100...1000 Hz
response time		1 s (1 channel), option: 70 ms
housing material		PA, TPS, PC, Polyester, stainless steel
degree of protection according to IEC/EN 60529		IP65
dimensions		see dimensional drawing
weight		2.2 kg
fixation		QuickFix pipe mounting fixture
ambient temperature		-10...+60 °C
display		2 x 16 characters, dot matrix, backlight
menu language		English, German, French, Dutch, Spanish
explosion protection		
ATEX / IECEx	category EPL zone	gas: 3G dust: 2D Gc Db 2 21
	marking	CE 0637 Ex II3G II2D Ex nA nC [ic] IIC (T6)T4 Gc Ex tb IIIC T 100 °C Db T_a -10...+(50)60 °C
	certification ATEX	IBExU10ATEX1067
	certification IECEx	IECEx IBE 12.0006
	type of protection	gas: non sparking dust: protection by enclosure temperature inputs: intrinsic safety
	intrinsic safety parameters	U_m = 16 V DC intrinsically safe inputs: U_o = 22 V, I_o = 6 mA, P_o = 33 mW, C_o = 450 nF, L_o = 10 mH, C_i = 1.8 nF, L_i = 10 µH

FLUXUS	**G608**-A2**
measuring functions	
physical quantities	operating volumetric flow rate, standard volumetric flow rate, mass flow rate, flow velocity
totalizer	volume, mass
calculation functions	average, difference, sum
diagnostic functions	sound speed, signal amplitude, SNR, SCNR, standard deviation of amplitudes and transit times
data logger	
loggable values	all physical quantities, totalized values and diagnostic values
capacity	> 100 000 measured values
communication	
interface	RS232/USB
serial data kit	
software (all Windows™ versions)	- FluxData: download of measurement data, graphical presentation, conversion to other formats (e.g. for Excel™) - FluxDiag (optional): online diagnostics and report generation - FluxSubstanceLoader: upload of fluid data sets
cable	RS232
adapter	RS232 - USB
transport case	
dimensions	500 x 400 x 190 mm
outputs	
	The outputs are galvanically isolated from the transmitter.
number - analog outputs - binary outputs	 max. 4 0, 2 or 4 active current outputs or passive current outputs or frequency outputs or 2 active current outputs and 2 passive current outputs or 2 active current outputs and 2 frequency outputs or 2 passive current outputs and 2 frequency outputs max. 4
accessories	output adapter (necessary, option)
	current output
range	0/4...20 mA
accuracy	0.1 % of reading ±15 µA
active output	R_{ext} < 200 Ω
passive output	U_{ext} = 4...9 V, depending on R_{ext} R_{ext} < 200 Ω
	frequency output
range	0...5 kHz
open collector	24 V/4 mA
	binary output
optorelay	26 V/100 mA
binary output as alarm output - functions	 limit, change of flow direction or error
binary output as pulse output - pulse value - pulse width	mainly for totalizing 0.01...1000 units 1...1000 ms
inputs	
	The inputs are galvanically isolated from the transmitter.
number	max. 4
accessories	input adapter (if number of inputs > 2)
	temperature input (intrinsic safety)
type connection range resolution accuracy	Pt100/Pt1000 4-wire -150...+560 °C 0.01 K ±0.01 % of reading ±0.03 K

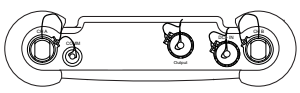
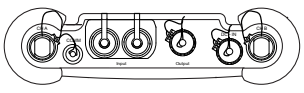
For the technical data in the flow measurement of liquids mode see Technical specification TSFLUXUS_F608xx-A2Vx-x.

Dimensions



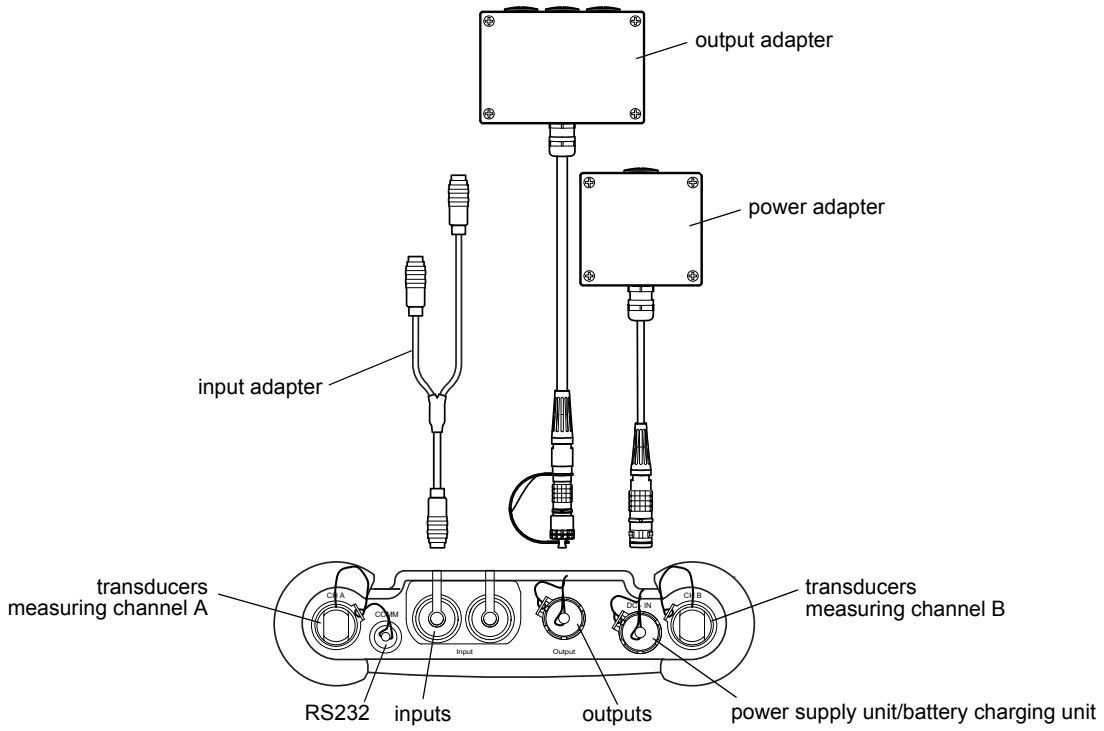
in mm

Standard scope of supply

	G608 Standard	G608 CA-Energy
application	flow measurement on gas	flow measurement on compressed air, industrial gases and liquids
	2 independent measuring channels	
	calculation of standard volumetric flow rate	calculation of standard volumetric flow rate, with optional use of current measured temperature values
		liquids: integrated heat flow computer for monitoring of energy flows
outputs		
passive current output	2	2
binary output	2	2
inputs		
temperature input	-	4
accessories		
transport case	x	x
power supply unit, mains cable	x	x
battery	x	x
power adapter[1]	-	-
output adapter[1]	-	-
input adapter	-	2
QuickFix pipe mounting fixture for transmitter	x	x
serial data kit	x	x
measuring tape	x	x
wall thickness probe	-	x
user manual, safety instructions, Quick start guide	x	x
connector board at the upper side of the transmitter		

[1] if required, to be ordered separately

Adapters (optional)

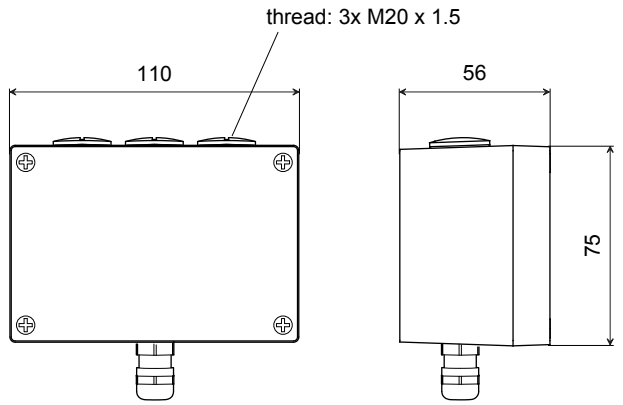


Technical data

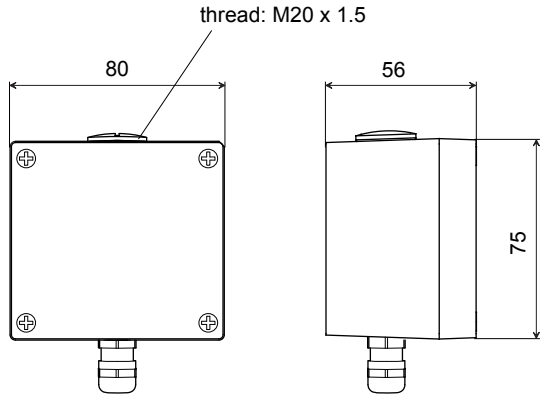
			output adapter	power adapter
technical type			**OA608A2**	**PA608A2**
connection voltage				10.5...15 V DC
dimensions			see dimensional drawing	
weight		kg	0.26	0.26
material				
housing gasket			polyester silicone	
degree of protection according to IEC/ EN 60529			IP66	
ambient temperature				
min. max.		°C °C	-20 +90	
explosion protection				
ATEX	zone		2	
	marking		CE Ex II3G Ex nA IIC T6 Gc Ta -10...+60 °C	
	type of protection		non sparking	

Dimensions

output adapter



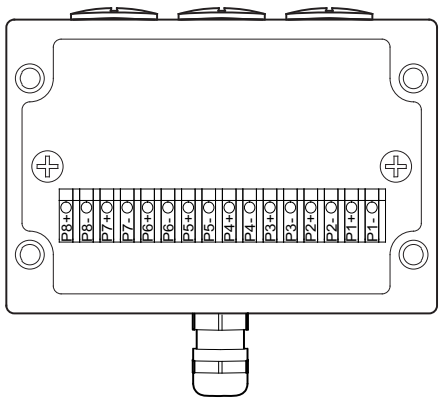
power adapter



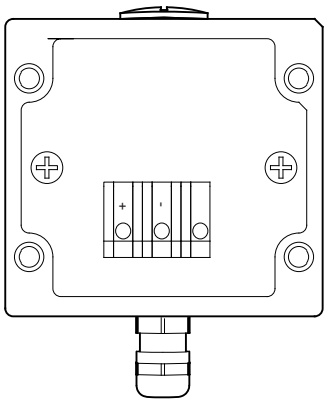
in mm

Terminal assignment

output adapter



power adapter

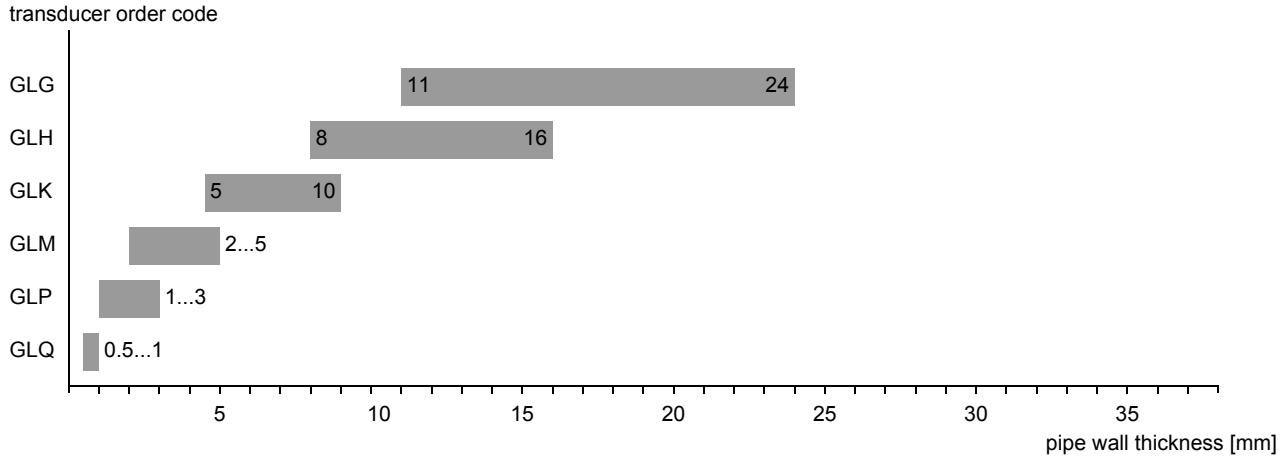


Transducers

Transducer selection

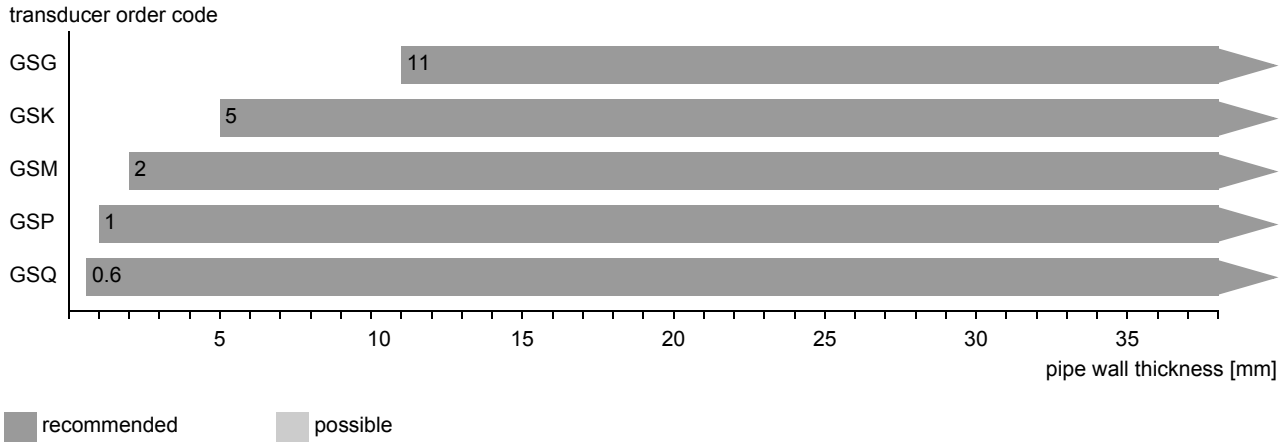
Step 1a

Select a Lamb wave transducer:



Step 1b

If the pipe wall thickness is not in the range of the Lamb wave transducers, select a shear wave transducer:

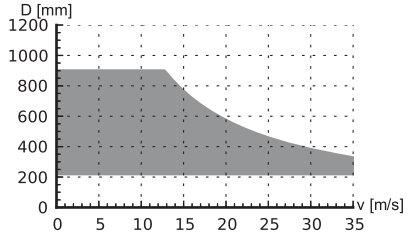
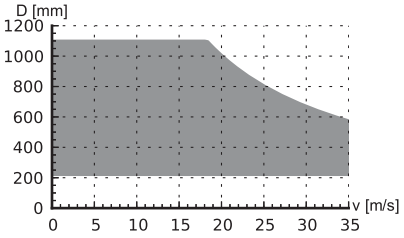
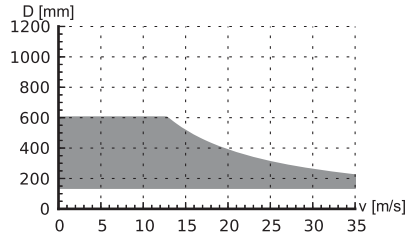
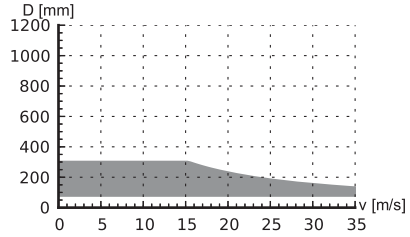
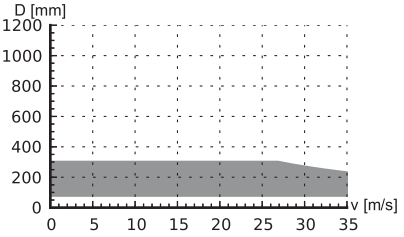
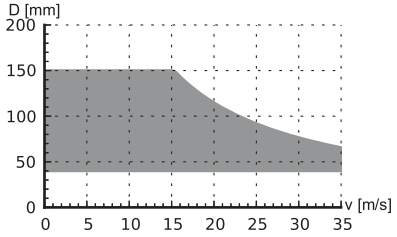
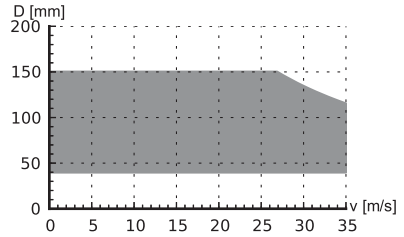
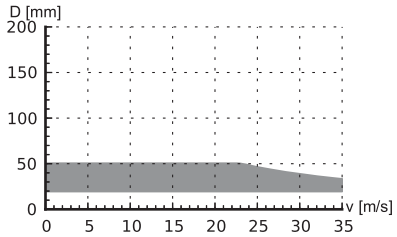
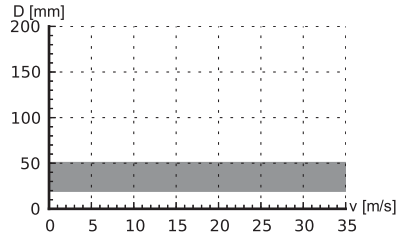
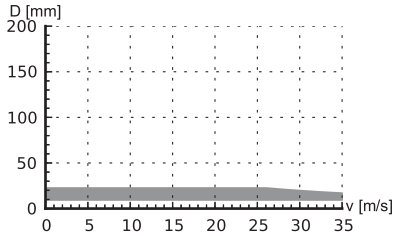
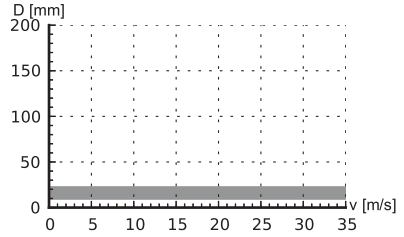


Step 2

inner pipe diameter d dependent on the flow velocity v of the fluid in the pipe

The transducers are selected from the characteristics (see next page). Lamb wave transducers are selected from the left column, shear wave transducers from the right column.

Lamb wave transducers: If the values d and v are not in the range, the diagonal arrangement with 1 sound path may be used, i.e. the same characteristics can be used with doubling the inner pipe diameter. If the values are still not in the range, shear waves transducers regarding the pipe wall thickness have to be selected in step 1b.

Lamb wave transducer[1]		shear wave transducer[1]	
	GLG		GSG
	GLH		
	GLK		GSK
	GLM		GSM
	GLP		GSP
	GLQ		GSQ

[1] inner pipe diameter and max. flow velocity for a typical application with natural gas, nitrogen, oxygen in reflection arrangement with 2 sound paths (Lamb wave transducers)/1 sound path (shear wave transducers)

Step 3

min. fluid pressure

Lamb wave transducer			
transducer order code	fluid pressure[1] [bar]		
	metal pipe		plastic pipe
	min.	min. extended	min.
GLG	15	10	1
GLH	15	10	1
GLK	15 (d > 120 mm) 10 (d < 120 mm)	10 (d > 120 mm) 3 (d < 120 mm)	1
GLM	10 (d > 60 mm) 5 (d < 60 mm)	3 (d < 60 mm)	1
GLP	10 (d > 35 mm) 5 (d < 35 mm)	3 (d < 35 mm)	1
GLQ	10 (d > 15 mm) 5 (d < 15 mm)	3 (d < 15 mm)	1

shear wave transducer			
transducer order code	fluid pressure[1] [bar]		
	metal pipe		plastic pipe
	min.	min. extended	min.
GSG	30	20	1
GSK	30	20	1
GSM	30	20	1
GSP	30	20	1
GSQ	30	20	1

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

d - inner pipe diameter

Example

step					
1	pipe wall thickness selected transducer	mm	14.3 GLG or GLH	8.6 GLH or GLK	38 GS
2	inner pipe diameter max. flow velocity selected transducer	mm m/s	581 15 GLG	96.8 30 GLK	143 30 GSK
3	min. fluid pressure selected transducer	bar	20 GLG	15 GLK	40 GSK

Step 4

for the characters 4...11 of the transducer order code (ambient temperature, explosion protection, connection system, extension cable) see page 15

Step 5

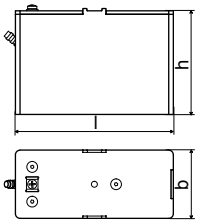
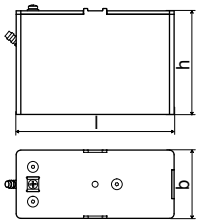
for the technical data of the selected transducer see page 16 et seqq.

Transducer order code

1, 2	3		4	5, 6	7, 8		9...11		12, 13	no. of character
transducer	transducer frequency	-	ambient temperature	explosion protection	connection system	-	extension cable	/	option	description
GL										set of ultrasonic flow transducers for gas measurement, Lamb wave
GS										set of ultrasonic flow transducers for gas measurement, shear wave
	G									0.2 MHz
	H									0.3 MHz (Lamb wave only)
	K									0.5 MHz
	M									1 MHz
	P									2 MHz
	Q									4 MHz
			N							normal temperature range
			E							extended temperature range (FSM, FSP, FSQ)
				A1						ATEX zone 1/IECEx zone 1
					NL					with Lemo connector
							XXX			cable length in m, for max. length of extension cable see page 29 (connector outside of ATEX zone 1/IECEx zone 1)
									LC	long transducer cable
example										
GL	K	-	N	A2	NL	-	010			Lamb wave transducer 0.5 MHz, normal temperature range, ATEX zone 2/IECEx zone 2, connection system NL with Lemo connector and extension cable 10 m
		-				-		/		

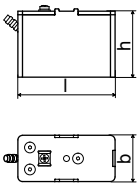
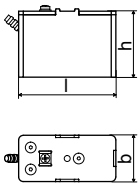
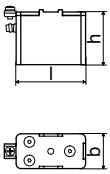
Technical data

Shear wave transducers (zone 1)

technical type		GDG1NW1	GLG1NW1	GDK1NW1	GLK1NW1
order code		**GSG-NA1NL**	**GSG-NA1NL/LC**	**GSK-NA1NL**	**GSK-NA1NL/LC**
transducer frequency	MHz	0.2		0.5	
fluid pressure[1]					
min. extended min.	bar bar	metal pipe: 20 metal pipe: 30 plastic pipe: 1		metal pipe: 20 metal pipe: 30 plastic pipe: 1	
inner pipe diameter d[2]					
min. extended min. recommended max. recommended max. extended	mm mm mm mm	180 220 900 1100		60 80 300 360	
pipe wall thickness					
min.	mm	11		5	
material					
housing contact surface		PEEK with stainless steel cap and transducer shoe 304 (1.4301) PEEK		PEEK with stainless steel cap and transducer shoe 304 (1.4301) PEEK	
degree of protection according to IEC/ EN 60529		IP65		IP66	
transducer cable					
type length	 m	1699 5	1699 9	1699 5	1699 9
dimensions					
length l width b height h	mm mm mm	136.5 59 90.5		136.5 59 90.5	
dimensional drawing					
ambient temperature					
min. max.	°C °C	-40 +130		-40 +130	
temperature compensation		x		x	
explosion protection					
ATEX/IECEx	category EPL zone		gas: 2/3G dust: 2D Gb/Gc Db 1/2 21		gas: 2/3G dust: 2D Gb/Gc Db 1/2 21
	explosion protection temperature (pipe surface)				
	min. max.	°C °C	-55 +180		-55 +180
	marking		CE 0637 Ex II2/3G II2D Ex q nA IIC T6...T2 Gb/Gc Ex tb IIIC TX Db		CE 0637 Ex II2/3G II2D Ex q nA IIC T6...T2 Gb/Gc Ex tb IIIC TX Db
	certification ATEX		IBExU10ATEX1162 X		IBExU10ATEX1162 X
	certification IECEx		IECEx IBE 12.0004X		IECEx IBE 12.0004X
	type of protection		gas: powder filling, non sparking dust: protection by enclosure		gas: powder filling, non sparking dust: protection by enclosure

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

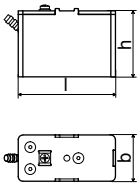
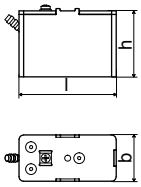
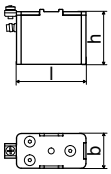
[2] shear wave transducer:
typical values for natural gas, nitrogen, oxygen, pipe diameters for other fluids on request
inner pipe diameter max. recommended/max. extended: in reflection arrangement and for a flow velocity of 15 m/s

technical type		GDM2NW1	GLM2NW1	GDP2NW1	GLP2NW1	GDQ2NW1	GLQ2NW1
order code		**GSM-NA1NL**	**GSM-NA1NL/LC**	**GSP-NA1NL**	**GSP-NA1NL/LC**	**GSQ-NA1NL**	**GSQ-NA1NL/LC**
transducer frequency	MHz	1		2		4	
fluid pressure[1]							
min. extended min.	bar bar	metal pipe: 20 metal pipe: 30 plastic pipe: 1		metal pipe: 20 metal pipe: 30 plastic pipe: 1		metal pipe: 20 metal pipe: 30 plastic pipe: 1	
inner pipe diameter d[2]							
min. extended	mm	30		15		7	
min. recommended	mm	40		20		10	
max. recommended	mm	150		50		22	
max. extended	mm	180		60		30	
pipe wall thickness							
min.	mm	2		1		0.6	
material							
housing contact surface		PEEK with stainless steel cap and transducer shoe 304 (1.4301) PEEK		PEEK with stainless steel cap and transducer shoe 304 (1.4301) PEEK		PEEK with stainless steel cap and transducer shoe 304 (1.4301) PEEK	
degree of protection according to IEC/ EN 60529		IP66		IP66		IP65	
transducer cable							
type length	 m	1699 4	1699 9	1699 4	1699 9	1699 3	1699 9
dimensions							
length l	mm	84		84		70	
width b	mm	40		40		30	
height h	mm	59		59		47.5	
dimensional drawing							
ambient temperature							
min. max.	°C °C	-40 +130		-40 +130		-40 +130	
temperature compen-sation		x		x		x	
explosion protection							
ATEX / IECEx category EPL zone		gas: 2/3G dust: 2D Gb/Gc Db 1/2 21		gas: 2/3G dust: 2D Gb/Gc Db 1/2 21		gas: 2/3G dust: 2D Gb/Gc Db 1/2 21	
explosion protection temperature (pipe surface)							
min. max.	°C °C	-55 +180		-55 +180		-55 +180	
marking		CE 0637 Ex II2/3G II2D Ex q nA IIC T6...T2 Gb/Gc Ex tb IIIC TX Db		CE 0637 Ex II2/3G II2D Ex q nA IIC T6...T2 Gb/Gc Ex tb IIIC TX Db		CE 0637 Ex II2/3G II2D Ex q nA IIC T6...T2 Gb/Gc Ex tb IIIC TX Db	
certification ATEX		IBExU10ATEX1162 X		IBExU10ATEX1162 X		IBExU10ATEX1162 X	
certification IECEx		IECEx IBE 12.0004X		IECEx IBE 12.0004X		IECEx IBE 12.0004X	
type of protection		gas: powder filling, non sparking dust: protection by enclosure		gas: powder filling, non sparking dust: protection by enclosure		gas: powder filling, non sparking dust: protection by enclosure	

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

[2] shear wave transducer:
typical values for natural gas, nitrogen, oxygen, pipe diameters for other fluids on request
inner pipe diameter max. recommended/max. extended: in reflection arrangement and for a flow velocity of 15 m/s

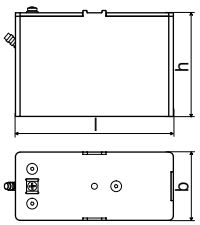
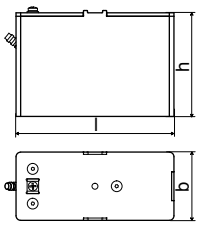
Shear wave transducers (zone 1, extended temperature range)

technical type		GDM2EW5	GLM2EW5	GDP2EW5	GLP2EW5	GDQ2EW5	GLQ2EW5
order code		**GSM-EA1NL**	**GSM-EA1NL/LC**	**GSP-EA1NL**	**GSP-EA1NL/LC**	**GSQ-EA1NL**	**GSQ-EA1NL/LC**
transducer frequency	MHz	1		2		4	
fluid pressure[1]							
min. extended	bar	metal pipe: 20		metal pipe: 20		metal pipe: 20	
min.	bar	metal pipe: 30 plastic pipe: 1		metal pipe: 30 plastic pipe: 1		metal pipe: 30 plastic pipe: 1	
inner pipe diameter d[2]							
min. extended	mm	30		15		7	
min. recommended	mm	40		20		10	
max. recommended	mm	150		50		22	
max. extended	mm	180		60		30	
pipe wall thickness							
min.	mm	2		1		0.6	
material							
housing		PI with stainless steel cap and transducer shoe 304 (1.4301)		PI with stainless steel cap and transducer shoe 304 (1.4301)		PI with stainless steel cap and transducer shoe 304 (1.4301)	
contact surface		PI		PI		PI	
degree of protection according to IEC/ EN 60529		IP66		IP66		IP56	
transducer cable							
type		6111	6111	6111	6111	6111	6111
length	m	4	9	4	9	3	9
dimensions							
length l	mm	84		84		70	
width b	mm	40		40		30	
height h	mm	59		59		47.5	
dimensional drawing							
ambient temperature							
min.	°C	-30		-30		-30	
max.	°C	+200		+200		+200	
temperature compensation		x		x		x	
explosion protection							
ATEX / IECEx category EPL zone		gas: 2/3G dust: 2D Gb/Gc Db 1/2 21		gas: 2/3G dust: 2D Gb/Gc Db 1/2 21		gas: 2/3G dust: 2D Gb/Gc Db 1/2 21	
explosion protection temperature (pipe surface)							
min.	°C	-45		-45		-45	
max.	°C	+225		+225		+225	
marking		CE 0637 Ex II2/3G II2D Ex q nA IIC T6...T2 Gb/Gc Ex tb IIIA TX Db		CE 0637 Ex II2/3G II2D Ex q nA IIC T6...T2 Gb/Gc Ex tb IIIA TX Db		CE 0637 Ex II2/3G II2D Ex q nA IIC T6...T2 Gb/Gc Ex tb IIIA TX Db	
certification ATEX		IBExU10ATEX1162 X		IBExU10ATEX1162 X		IBExU10ATEX1162 X	
certification IECEx		IECEx IBE 12.0004X		IECEx IBE 12.0004X		IECEx IBE 12.0004X	
type of protection		gas: powder filling, non sparking dust: protection by enclosure		gas: powder filling, non sparking dust: protection by enclosure		gas: powder filling, non sparking dust: protection by enclosure	

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

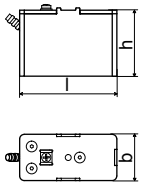
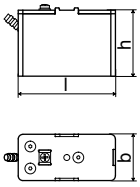
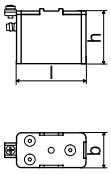
[2] shear wave transducer:
typical values for natural gas, nitrogen, oxygen, pipe diameters for other fluids on request
inner pipe diameter max. recommended/max. extended: in reflection arrangement and for a flow velocity of 15 m/s

Shear wave transducers (zone 2)

technical type			GDG1NH1	GDK1NH1
order code			**GSG-NA2NL**	**GSK-NA2NL**
transducer frequency		MHz	0.2	0.5
fluid pressure[1]				
min. extended min.		bar bar	metal pipe: 20 metal pipe: 30 plastic pipe: 1	metal pipe: 20 metal pipe: 30 plastic pipe: 1
inner pipe diameter d[2]				
min. extended min. recommended max. recommended max. extended		mm mm mm mm	180 220 900 1100	60 80 300 360
pipe wall thickness				
min.		mm	11	5
material				
housing contact surface			PEEK with stainless steel cap and transducer shoe 304 (1.4301) PEEK	PEEK with stainless steel cap and transducer shoe 304 (1.4301) PEEK
degree of protection according to IEC/ EN 60529			IP65	IP66
transducer cable				
type length		m	1699 5	1699 5
dimensions				
length l width b height h		mm mm mm	136.5 59 90.5	136.5 59 90.5
dimensional drawing				
ambient temperature				
min. max.		°C °C	-40 +130	-40 +130
temperature compen-sation			x	x
explosion protection				
ATEX / IECEx	category EPL zone		gas: 3G dust: 2D Gc Db 2 21	gas: 3G dust: 2D Gc Db 2 21
	explosion protection temperature (pipe surface)			
	min. max.	°C °C	-55 gas: +190, dust: +180	-55 gas: +190, dust: +180
	marking		CE 0637 Ex II3G II2D Ex nA IIC T6...T2 Gc Ex tb IIIC TX Db	CE 0637 Ex II3G II2D Ex nA IIC T6...T2 Gc Ex tb IIIC TX Db
	certification ATEX		IBExU10ATEX1163 X	IBExU10ATEX1163 X
	certification IECEx		IECEx IBE 12.0005X	IECEx IBE 12.0005X
	type of protection		gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

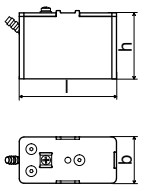
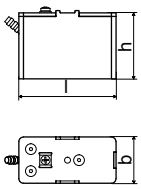
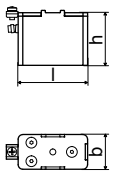
[2] shear wave transducer:
typical values for natural gas, nitrogen, oxygen, pipe diameters for other fluids on request
inner pipe diameter max. recommended/max. extended: in reflection arrangement and for a flow velocity of 15 m/s

technical type			GDM2NH1	GDP2NH1	GDQ2NH1
order code			**GSM-NA2NL**	**GSP-NA2NL**	**GSQ-NA2NL**
transducer frequency	MHz		1	2	4
fluid pressure[1]					
min. extended min.	bar bar		metal pipe: 20 metal pipe: 30 plastic pipe: 1	metal pipe: 20 metal pipe: 30 plastic pipe: 1	metal pipe: 20 metal pipe: 30 plastic pipe: 1
inner pipe diameter d[2]					
min. extended min. recommended max. recommended max. extended	mm mm mm mm		30 40 150 180	15 20 50 60	7 10 22 30
pipe wall thickness					
min.	mm		2	1	0.6
material					
housing contact surface			PEEK with stainless steel cap and transducer shoe 304 (1.4301) PEEK	PEEK with stainless steel cap and transducer shoe 304 (1.4301) PEEK	PEEK with stainless steel cap and transducer shoe 304 (1.4301) PEEK
degree of protection according to IEC/ EN 60529			IP66	IP66	IP65
transducer cable					
type length	 m		1699 4	1699 4	1699 3
dimensions					
length l width b height h	mm mm mm		84 40 59	84 40 59	70 30 47.5
dimensional drawing					
ambient temperature					
min. max.	°C °C		-40 +130	-40 +130	-40 +130
temperature compen-sation			x	x	x
explosion protection					
ATEX / IECEx	category EPL zone		gas: 3G dust: 2D Gc Db 2 21	gas: 3G dust: 2D Gc Db 2 21	gas: 3G dust: 2D Gc Db 2 21
	explosion protection temperature (pipe surface)				
	min. max.	°C °C	-55 gas: +190, dust: +180	-55 gas: +190, dust: +180	-55 gas: +190, dust: +180
	marking		CE 0637 Ex II3G II2D Ex nA IIC T6...T2 Gc Ex tb IIIC TX Db	CE 0637 Ex II3G II2D Ex nA IIC T6...T2 Gc Ex tb IIIC TX Db	CE 0637 Ex II3G II2D Ex nA IIC T6...T2 Gc Ex tb IIIC TX Db
	certification ATEX		IBExU10ATEX1163 X	IBExU10ATEX1163 X	IBExU10ATEX1163 X
	certification IECEx		IECEx IBE 12.0005X	IECEx IBE 12.0005X	IECEx IBE 12.0005X
	type of protection		gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

[2] shear wave transducer:
typical values for natural gas, nitrogen, oxygen, pipe diameters for other fluids on request
inner pipe diameter max. recommended/max. extended: in reflection arrangement and for a flow velocity of 15 m/s

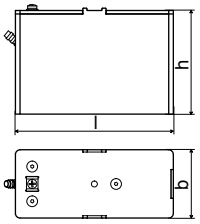
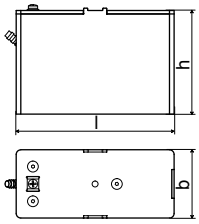
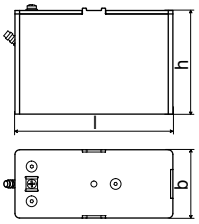
Shear wave transducers (zone 2, extended temperature range)

technical type			GDM2EH5	GDP2EH5	GDQ2EH5
order code			**GSM-EA2NL**	**GSP-EA2NL**	**GSQ-EA2NL**
transducer frequency		MHz	1	2	4
fluid pressure[1]					
min. extended min.		bar bar	metal pipe: 20 metal pipe: 30 plastic pipe: 1	metal pipe: 20 metal pipe: 30 plastic pipe: 1	metal pipe: 20 metal pipe: 30 plastic pipe: 1
inner pipe diameter d[2]					
min. extended min. recommended max. recommended max. extended		mm mm mm mm	30 40 150 180	15 20 50 60	7 10 22 30
pipe wall thickness					
min.		mm	2	1	0.6
material					
housing contact surface			PI with stainless steel cap and transducer shoe 304 (1.4301) PI	PI with stainless steel cap and transducer shoe 304 (1.4301) PI	PI with stainless steel cap and transducer shoe 304 (1.4301) PI
degree of protection according to IEC/ EN 60529			IP66	IP66	IP56
transducer cable					
type length		 m	6111 4	6111 4	6111 3
dimensions					
length l width b height h		mm mm mm	84 40 59	84 40 59	70 30 47.5
dimensional drawing					
ambient temperature					
min. max.		°C °C	-30 +200	-30 +200	-30 +200
temperature compen-sation			x	x	x
explosion protection					
ATEX / IECEx	category EPL zone		gas: 3G dust: 2D Gc Db 2 21	gas: 3G dust: 2D Gc Db 2 21	gas: 3G dust: 2D Gc Db 2 21
	explosion protection temperature (pipe surface)				
	min. max.	°C °C	-45 gas: +235, dust: +225	-45 gas: +235, dust: +225	-45 gas: +235, dust: +225
	marking		CE 0637 Ex II3G II2D Ex nA IIC T6...T2 Gc Ex tb IIIA TX Db	CE 0637 Ex II3G II2D Ex nA IIC T6...T2 Gc Ex tb IIIA TX Db	CE 0637 Ex II3G II2D Ex nA IIC T6...T2 Gc Ex tb IIIA TX Db
	certification ATEX		IBExU10ATEX1163 X	IBExU10ATEX1163 X	IBExU10ATEX1163 X
	certification IECEx		IECEx IBE 12.0005X	IECEx IBE 12.0005X	IECEx IBE 12.0005X
	type of protection		gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

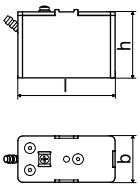
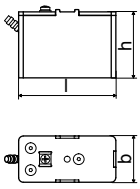
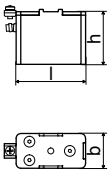
[2] shear wave transducer:
typical values for natural gas, nitrogen, oxygen, pipe diameters for other fluids on request
inner pipe diameter max. recommended/max. extended: in reflection arrangement and for a flow velocity of 15 m/s

Lamb wave transducers (zone 1)

technical type		GRG1NW3	GTG1NW3	GRH1NW3	GTH1NW3	GRK1NW3	GTK1NW3
order code		**GLG-NA1NL**	**GLG-NA1NL/LC**	**GLH-NA1NL**	**GLH-NA1NL/LC**	**GLK-NA1NL**	**GLK-NA1NL/LC**
transducer frequency	MHz	0.2		0.3		0.5	
fluid pressure[1]							
min. extended	bar	metal pipe: 10		metal pipe: 10		metal pipe: 10 (d > 120 mm), 3 (d < 120 mm)	
min.	bar	metal pipe: 15 plastic pipe: 1		metal pipe: 15 plastic pipe: 1		metal pipe: 15 (d > 120 mm), 10 (d < 120 mm) plastic pipe: 1	
inner pipe diameter d[2]							
min. extended	mm	180		110		60	
min. recommended	mm	220		140		80	
max. recommended	mm	900		600		300	
max. extended	mm	1400		1000		360	
pipe wall thickness							
min.	mm	11		8		5	
max.	mm	24		16		10	
material							
housing		PPSU with stainless steel cap and transducer shoe 304 (1.4301)		PPSU with stainless steel cap and transducer shoe 304 (1.4301)		PPSU with stainless steel cap and transducer shoe 304 (1.4301)	
contact surface		PPSU		PPSU		PPSU	
degree of protection according to IEC/ EN 60529		IP66		IP66		IP66	
transducer cable							
type		1699	1699	1699	1699	1699	1699
length	m	5	9	5	9	5	9
dimensions							
length l	mm	136.5		136.5		136.5	
width b	mm	59		59		59	
height h	mm	90.5		90.5		90.5	
dimensional drawing							
ambient temperature							
min.	°C	-40		-40		-40	
max.	°C	+170		+170		+170	
temperature compensation		x		x		x	
explosion protection							
ATEX / IECEx category EPL zone		gas: 2/3G dust: 2D Gb/Gc Db 1/2 21		gas: 2/3G dust: 2D Gb/Gc Db 1/2 21		gas: 2/3G dust: 2D Gb/Gc Db 1/2 21	
explosion protection temperature (pipe surface)							
min.	°C	-55		-55		-55	
max.	°C	+140		+140		+140	
marking		CE 0637 Ex II2/3G II2D Ex q nA IIC T6...T2 Gb/Gc Ex tb IIIC TX Db		CE 0637 Ex II2/3G II2D Ex q nA IIC T6...T2 Gb/Gc Ex tb IIIC TX Db		CE 0637 Ex II2/3G II2D Ex q nA IIC T6...T2 Gb/Gc Ex tb IIIC TX Db	
certification ATEX		IBExU10ATEX1162 X		IBExU10ATEX1162 X		IBExU10ATEX1162 X	
certification IECEx		IECEx IBE 12.0004X		IECEx IBE 12.0004X		IECEx IBE 12.0004X	
type of protection		gas: powder filling, non sparking dust: protection by enclosure		gas: powder filling, non sparking dust: protection by enclosure		gas: powder filling, non sparking dust: protection by enclosure	

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

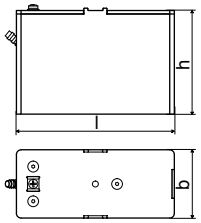
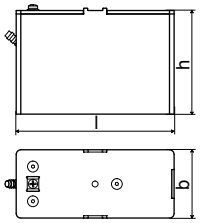
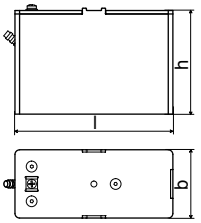
[2] Lamb wave transducer:
typical values for natural gas, nitrogen, oxygen, pipe diameters for other fluids on request
inner pipe diameter max. recommended: in reflection arrangement (diagonal arrangement) and for a flow velocity of 15 m/s (30 m/s)
inner pipe diameter max. extended: in reflection arrangement (diagonal arrangement) and for a flow velocity of 12 m/s (25 m/s)

technical type		GRM1NW3	GTM1NW3	GRP1NW3	GTP1NW3	GRQ1NW3	GTQ1NW3
order code		**GLM-NA1NL**	**GLM-NA1NL/LC**	**GLP-NA1NL**	**GLP-NA1NL/LC**	**GLQ-NA1NL**	**GLQ-NA1NL/LC**
transducer frequency	MHz	1		2		4	
fluid pressure[1]							
min. extended	bar	metal pipe: 3 (d < 60 mm)		metal pipe: 3 (d < 35 mm)		metal pipe: 3 (d < 15 mm)	
min.	bar	metal pipe: 10 (d > 60 mm), 5 (d < 60 mm) plastic pipe: 1		metal pipe: 10 (d > 35 mm), 5 (d < 35 mm) plastic pipe: 1		metal pipe: 10 (d > 15 mm), 5 (d < 15 mm) plastic pipe: 1	
inner pipe diameter d[2]							
min. extended	mm	30		15		7	
min. recommended	mm	40		20		10	
max. recommended	mm	150		50		22	
max. extended	mm	180		60		30	
pipe wall thickness							
min.	mm	2		1		0.5	
max.	mm	5		3		1	
material							
housing		PPSU with stainless steel cap and transducer shoe 304 (1.4301)		PPSU with stainless steel cap and transducer shoe 304 (1.4301)		PPSU with stainless steel cap and transducer shoe 304 (1.4301)	
contact surface		PPSU		PPSU		PPSU	
degree of protection according to IEC/ EN 60529		IP65		IP65		IP65	
transducer cable							
type		1699	1699	1699	1699	1699	1699
length	m	4	9	4	9	4	9
dimensions							
length l	mm	84		84		70	
width b	mm	40		40		30	
height h	mm	59		59		47.5	
dimensional drawing							
ambient temperature							
min.	°C	-40		-40		-40	
max.	°C	+170		+170		+170	
temperature compensation		x		x		x	
explosion protection							
ATEX / IECEx category EPL zone		gas: 2/3G dust: 2D Gb/Gc Db 1/2 21		gas: 2/3G dust: 2D Gb/Gc Db 1/2 21		gas: 2/3G dust: 2D Gb/Gc Db 1/2 21	
explosion protection temperature (pipe surface)							
min.	°C	-55		-55		-55	
max.	°C	+140		+140		+140	
marking		CE 0637 Ex II2/3G II2D Ex q nA IIC T6...T2 Gb/Gc Ex tb IIIC TX Db		CE 0637 Ex II2/3G II2D Ex q nA IIC T6...T2 Gb/Gc Ex tb IIIC TX Db		CE 0637 Ex II2/3G II2D Ex q nA IIC T6...T2 Gb/Gc Ex tb IIIC TX Db	
certification ATEX		IBExU10ATEX1162 X		IBExU10ATEX1162 X		IBExU10ATEX1162 X	
certification IECEx		IECEx IBE 12.0004X		IECEx IBE 12.0004X		IECEx IBE 12.0004X	
type of protection		gas: powder filling, non sparking dust: protection by enclosure		gas: powder filling, non sparking dust: protection by enclosure		gas: powder filling, non sparking dust: protection by enclosure	

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

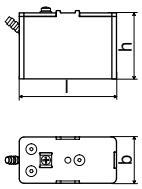
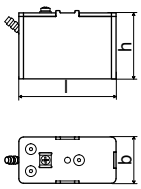
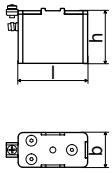
[2] Lamb wave transducer:
typical values for natural gas, nitrogen, oxygen, pipe diameters for other fluids on request
inner pipe diameter max. recommended: in reflection arrangement (diagonal arrangement) and for a flow velocity of 15 m/s (30 m/s)
inner pipe diameter max. extended: in reflection arrangement (diagonal arrangement) and for a flow velocity of 12 m/s (25 m/s)

Lamb wave transducers (zone 2)

technical type		GRG1NH3	GRH1NH3	GRK1NH3
order code		**GLG-NA2NL**	**GLH-NA2NL**	**GLK-NA2NL**
transducer frequency	MHz	0.2	0.3	0.5
fluid pressure[1]				
min. extended	bar	metal pipe: 10	metal pipe: 10	metal pipe: 10 (d > 120 mm) 3 (d < 120 mm)
min.	bar	metal pipe: 15 plastic pipe: 1	metal pipe: 15 plastic pipe: 1	metal pipe: 15 (d > 120 mm) 10 (d < 120 mm) plastic pipe: 1
inner pipe diameter d[2]				
min. extended	mm	180	110	60
min. recommended	mm	220	140	80
max. recommended	mm	900	600	300
max. extended	mm	1400	1000	360
pipe wall thickness				
min.	mm	11	8	5
max.	mm	24	16	10
material				
housing		PPSU with stainless steel cap and transducer shoe 304 (1.4301)	PPSU with stainless steel cap and transducer shoe 304 (1.4301)	PPSU with stainless steel cap and transducer shoe 304 (1.4301)
contact surface		PPSU	PPSU	PPSU
degree of protection according to IEC/ EN 60529		IP66	IP66	IP66
transducer cable				
type		1699	1699	1699
length	m	5	5	5
dimensions				
length l	mm	136.5	136.5	136.5
width b	mm	59	59	59
height h	mm	90.5	90.5	90.5
dimensional drawing				
ambient temperature				
min.	°C	-40	-40	-40
max.	°C	+170	+170	+170
temperature compensation		x	x	x
explosion protection				
ATEX/IECEx category EPL zone		gas: 3G dust: 2D Gc Db 2 21	gas: 3G dust: 2D Gc Db 2 21	gas: 3G dust: 2D Gc Db 2 21
explosion protection temperature (pipe surface)				
min.	°C	-55	-55	-55
max.	°C	gas: +150, dust: +140	gas: +150, dust: +140	gas: +150, dust: +140
marking		CE 0637 Ex II3G II2D Ex nA IIC T6...T2 Gc Ex tb IIIC TX Db	CE 0637 Ex II3G II2D Ex nA IIC T6...T2 Gc Ex tb IIIC TX Db	CE 0637 Ex II3G II2D Ex nA IIC T6...T2 Gc Ex tb IIIC TX Db
certification ATEX		IBExU10ATEX1163 X	IBExU10ATEX1163 X	IBExU10ATEX1163 X
certification IECEx		IECEx IBE 12.0005X	IECEx IBE 12.0005X	IECEx IBE 12.0005X
type of protection		gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

[2] Lamb wave transducer:
typical values for natural gas, nitrogen, oxygen, pipe diameters for other fluids on request
inner pipe diameter max. recommended: in reflection arrangement (diagonal arrangement) and for a flow velocity of 15 m/s (30 m/s)
inner pipe diameter max. extended: in reflection arrangement (diagonal arrangement) and for a flow velocity of 12 m/s (25 m/s)

technical type		GRM1NH3	GRP1NH3	GRQ1NH3
order code		**GLM-NA2NL**	**GLP-NA2NL**	**GLQ-NA2NL**
transducer frequency	MHz	1	2	4
fluid pressure[1]				
min. extended	bar	metal pipe: 3 (d < 60 mm)	metal pipe: 3 (d < 35 mm)	metal pipe: 3 (d < 15 mm)
min.	bar	metal pipe: 10 (d > 60 mm) 5 (d < 60 mm) plastic pipe: 1	metal pipe: 10 (d > 35 mm) 5 (d < 35 mm) plastic pipe: 1	metal pipe: 10 (d > 15 mm) 5 (d < 15 mm) plastic pipe: 1
inner pipe diameter d[2]				
min. extended	mm	30	15	7
min. recommended	mm	40	20	10
max. recommended	mm	150	50	22
max. extended	mm	180	60	30
pipe wall thickness				
min.	mm	2	1	0.5
max.	mm	5	3	1
material				
housing		PPSU with stainless steel cap and transducer shoe 304 (1.4301)	PPSU with stainless steel cap and transducer shoe 304 (1.4301)	PPSU with stainless steel cap and transducer shoe 304 (1.4301)
contact surface		PPSU	PPSU	PPSU
degree of protection according to IEC/ EN 60529		IP65	IP65	IP65
transducer cable				
type		1699	1699	1699
length	m	4	4	3
dimensions				
length l	mm	84	84	70
width b	mm	40	40	30
height h	mm	59	59	47.5
dimensional drawing				
ambient temperature				
min.	°C	-40	-40	-40
max.	°C	+170	+170	+170
temperature compen-sation		x	x	x
explosion protection				
ATEX / IECEx category EPL zone		gas: 3G dust: 2D Gc Db 2 21	gas: 3G dust: 2D Gc Db 2 21	gas: 3G dust: 2D Gc Db 2 21
explosion protection temperature (pipe surface)				
min.	°C	-55	-55	-55
max.	°C	gas: +150, dust: +140	gas: +150, dust: +140	gas: +150, dust: +140
marking		CE 0637 Ex II3G II2D Ex nA IIC T6...T2 Gc Ex tb IIIC TX Db	CE 0637 Ex II3G II2D Ex nA IIC T6...T2 Gc Ex tb IIIC TX Db	CE 0637 Ex II3G II2D Ex nA IIC T6...T2 Gc Ex tb IIIC TX Db
certification ATEX		IBExU10ATEX1163 X	IBExU10ATEX1163 X	IBExU10ATEX1163 X
certification IECEx		IECEx IBE 12.0005X	IECEx IBE 12.0005X	IECEx IBE 12.0005X
type of protection		gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure	gas: non sparking dust: protection by enclosure

[1] depending on application, typical absolute value for natural gas, nitrogen, compressed air

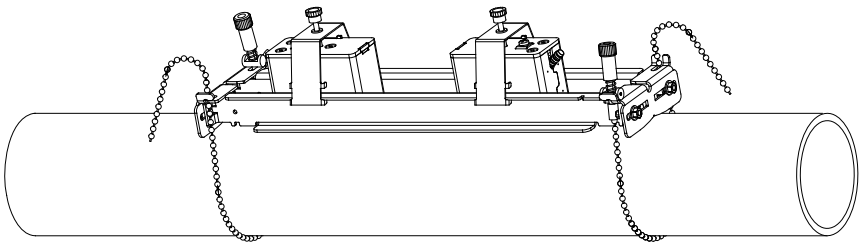
[2] Lamb wave transducer:
typical values for natural gas, nitrogen, oxygen, pipe diameters for other fluids on request
inner pipe diameter max. recommended: in reflection arrangement (diagonal arrangement) and for a flow velocity of 15 m/s (30 m/s)
inner pipe diameter max. extended: in reflection arrangement (diagonal arrangement) and for a flow velocity of 12 m/s (25 m/s)

Transducer mounting fixture

Order code

1, 2	3		4	5		6	7...9	no. of character
transducer mounting fixture	transducer	-	measurement arrangement	size	-	fixation	outer pipe diameter	description
VP								portable Variofix
	A							all transducers
			D					reflection arrangement or diagonal arrangement
			R					reflection arrangement
				M				medium
						C		chains
						N		without fixation
							055	10...550 mm
example								
VP	A	-	D	M	-	C	055	portable Variofix and chains
		-			-			

portable Variofix VP and chains



material: stainless steel 304 (1.4301), 301 (1.4310), 303 (1.4305)

dimensions:
414 x 94 x 76 mm

chain length: 2 m

Coupling materials for transducers

normal temperature range (4th character of transducer order code = N)		**extended temperature range (4th character of transducer order code = E)**	
< 100 °C	< 170 °C	< 150 °C	< 200 °C
coupling compound type N	coupling compound type E	coupling compound type E	coupling compound type E or H

Technical data

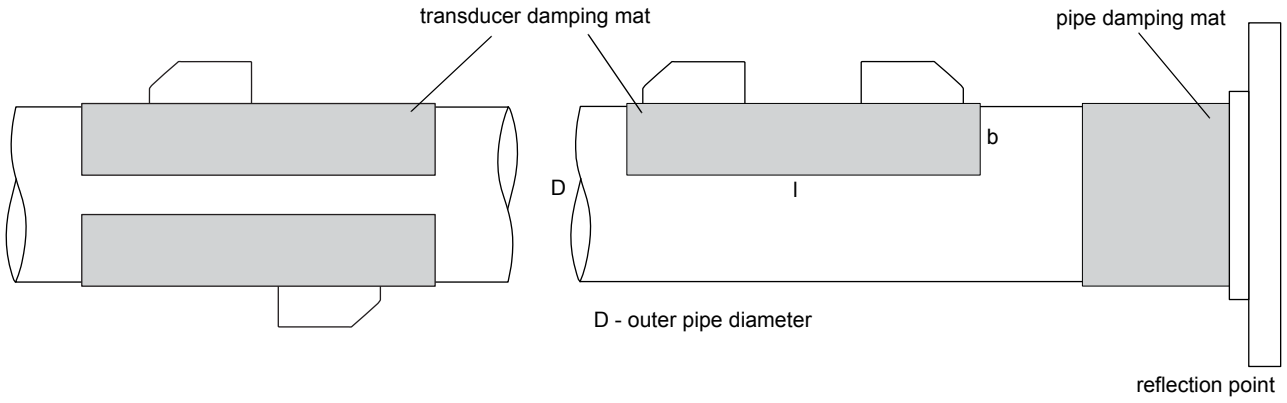
type	**ambient temperature** °C	**material**
coupling compound type N	-30...+130	mineral grease paste
coupling compound type E	-30...+200	silicone paste
coupling compound type H	-30...+250	fluoropolymer paste

Damping mats (optional)

Damping mats will be used for the gas measurement to reduce acoustic noise influences on the measurement.

Transducer damping mats will be installed below the transducers.

Pipe damping mats will be installed at reflection points, e.g. flange, weld.



Selection of damping mats

type	description	outer pipe diameter mm	dimensions l x b x h mm	transducer frequency F	G	H	K	M	P	Q	technical type	ambient temperature °C	remark
transducer damping mat													
D	for temporary installation (multiple use), fixed with coupling compound	< 80	450 x 115 x 0.5	-	-	-	-	x	x	x	D20S3	-25...+60	
		≥ 80	900 x 230 x 0.5	-	-	-	x	x	-	-	D20S2		
			900 x 230 x 1.3	x	x	x	-	-	-	-	D50S2		
pipe damping mat													
A	for temporary installation (multiple use), fixed with coupling compound	< 300	300 x 115 x 0.5	x	x	x	x	x	x	x	A20S4	-25...+60	for quantity see table below
B	self-adhesive	≥ 300	l x 100 x 0.9	x	x	x	x	x	x	-	B35R2	-35...+50	l - see table below

Quantity for pipe damping mat - type A

(depending on the outer pipe diameter)

outer pipe diameter D mm	transducer frequency F, G, H	K, M, P, Q
100	12	6
200	24	12
300	32	16

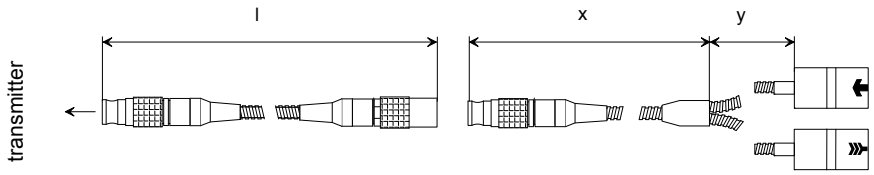
Length of pipe damping mat - type B

(length l depending on transducer frequency and outer pipe diameter)

outer pipe diameter D	transducer frequency F, G, H	K, M, P
mm	m	m
300	12	6
500	32	16
1000	126	63

Connection systems

connection system NL



	transducer frequency (3d character of transducer order code)		F, G, H, K			M, P			Q			S		
			x	**y**	**l**	**x**	**y**	**l**	**x**	**y**	**l**	**x**	**y**	**l**
N	cable length	m	2	3	≤ 10	2	2	≤ 10	2	1	≤ 10	1	1	≤ 10
L	cable length (option LC)	m	2	7	≤ 10	7	2	≤ 10	8	1	≤ 10	-	-	-

x, y - transducer cable length
l - max. length of extension cable

Transducer cable

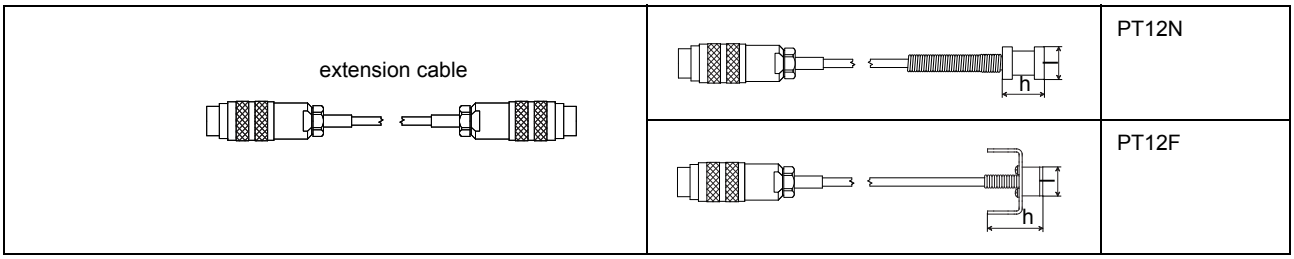
Technical data

		transducer cable		extension cable
type		1699	6111	1750
standard length	m	see table above		5 10
max. length	m	-		see table above
ambient temperature	°C	-55...+200	-100...+225	< 80
cable jacket				
material		PTFE	PFA	PE
outer diameter	mm	2.9	2.7	6
thickness	mm	0.3	0.5	0.5
colour		brown	white	black
shield		x	x	x
sheath				
material		stainless steel 304 (1.4301)	stainless steel 304 (1.4301)	stainless steel 304 (1.4301)
outer diameter	mm	8	8	9

Clamp-on temperature probe (optional)

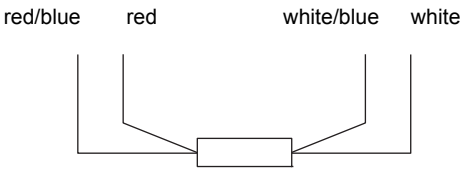
Technical data

technical type		**PT12N**	**PT12F**
design			short response time
type		Pt100	Pt100
connection		4-wire	4-wire
measuring range	°C	-30...+250	-50...+250
accuracy T		±(0.15 °C + 2 · 10^{-3} · |T [°C]|) class A	±(0.15 °C + 2 · 10^{-3} · |T [°C]|) class A
accuracy ΔT (2x Pt matched according to EN 1434-1)		≤ 0.1 K (3 K < ΔT < 6 K), more corresponding to EN 1434-1	≤ 0.1 K (3 K < ΔT < 6 K), more corresponding to EN 1434-1
response time	s	50	8
housing		aluminum	PEEK, stainless steel 304 (1.4301), copper
degree of protection according to IEC/ EN 60529		IP66	IP66
weight (without connector)	kg	0.25	0.32
fixation		clamp-on	clamp-on
accessories			
thermal conductivity paste 200 °C		x	x
thermal conductivity foil 250 °C		x	x
plastic protection plate, insulation foam		-	x
dimensions			
length l	mm	15	14
width b	mm	15	30
height h	mm	20	27



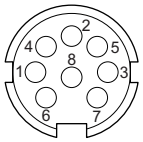
Connection

Temperature probe



Connector

pin	cable of temperature probe	extension cable
1	white/blue	blue
2	red/blue	grey
3, 4, 5	not connected	
6	red	red
7	white	white
8	not connected	



Cable

		cable of temperature probe	extension cable
type		4 x 0.25 mm² black	LIYCY 8 x 0.14 mm² grey
standard length	m	3	5/10/25
max. length	m	-	100
cable jacket		PTFE	PVC

Wall thickness measurement (optional)

The pipe wall thickness is an important pipe parameter which has to be determined exactly for a good measurement. However, the pipe wall thickness often is unknown.

The wall thickness probe can be connected to the transmitter instead of the flow transducers and the wall thickness measurement mode is activated automatically.

Acoustic coupling compound is applied to the wall thickness probe which then is placed firmly on the pipe. The wall thickness is displayed and can be stored directly in the transmitter.

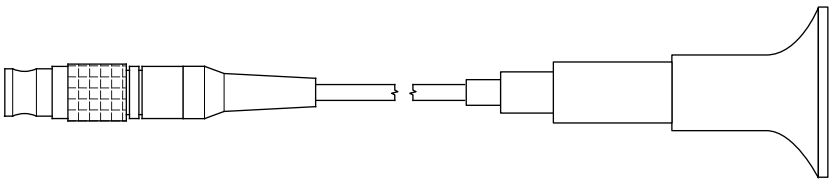
Technical data

technical type		DWR1NZ7
measuring range[1]	mm	1...250
resolution	mm	0.01
accuracy		1 % ± 0.1 mm
fluid temperature	°C	-20...+200, short-time peak max. 500
explosion protection		-
cable		
type		2616
length	m	1.5

[1] The measuring range depends on the attenuation of the ultrasonic signal in the pipe. For strongly attenuating plastics (e.g. PFA, PTFE, PP) the measuring range is smaller.

Cable

type		2616
ambient temperature	°C	<200
cable jacket		
material		FEP
outer diameter	mm	5.1
colour		black
shield		x



DWR1NZ7

FLEXIM GmbH
Wolfener Str. 36
12681 Berlin
Germany
Tel.: +49 (30) 93 66 76 60
Fax: +49 (30) 93 66 76 80

internet: www.flexim.com
e-mail: info@flexim.com

TSFLUXUS_G608xx-A2V2-1-1EN_Leu, 2016-12-21